



Interactions of allele *E* of the *MC1R* gene with *FM* and mutations in the *MLPH* gene cause the five-gray phenotype in the Anyi tile-like gray chicken

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ABSTRACT. The Anyi tile-like gray chicken is a Chinese indigenous breed with a gray dilution phenotype, having gray feathers, comb, skin, shanks, and beak, which is valuable for genetic research on pigmentation. However, the genetic basis of the gray dilution phenotype remains unknown. The objective of this study was to investigate

the genetic basis of the gray dilution phenotype in the Anyi tile-like gray chicken. We found that all Anyi tile-like gray chickens tested in this study carried at least one *E* allele, which is responsible for the appearance of black feathers, and some of them carried the *FM* allele, which is responsible for the black skin phenotype. A single nucleotide polymorphism (C.1909A>G) was identified within the melanophilin (*MLPH*) gene and was significantly associated with the gray dilution phenotype. Our findings suggest that the *E* and *FM* alleles act together to cause the development of the “five-black” phenotype (black feather, comb, skin, shank, and beak), whereas the *MLPH* mutation results in defective melanosome transport, leading to the development of the “five-gray” phenotype.

Key words: Gray dilution phenotype; *MC1R*; *EDN3*; *MLPH*; *RAB27A*; *MYO5A*